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GERMAN "AMT" MINE UNITS

September 1945

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TECHNICAL REPORT No. 385-45

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GERMAN "AMT" MINE UNITS

SUMMARY

This report contains information on the German AMT 1 and AMT 2 mine firing units. These units consisted of already-existent influence firing components and constitute a combination firing unit requiring acoustic (sonic), magnetic and subsonic influences to fire. These combinations were in the development stage at the end of the war in Europe and were not used operationally.

September 1945

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## GERMAN "AMT" MINE UNITS

### 1. Introduction

(a) Due to some operational shortcomings, the AT 2 (AA-2) and AT 3 (AA-3) units were considered unsatisfactory. Combination of these units with M4 unit was in development at the end of the war in Europe. The resultant combinations are known as AMT 1 and AMT 2. (Acoustic-Magnetic-Subsonic).

(b) No samples of the AMT units were captured, and all information herein contained has been obtained through preliminary examination of documents and interrogation of prisoners of war.

### 2. General

(a) The operational AT units had two faults:

- i. Both AT 2 and AT 3 tend to detonate spontaneously in strong currents.
- ii. Due to constant switching in the vicinity of a sound source, the life of the AT units is short, especially AT 2. (50 hours for AT 2 - 14 days for AT 3).

(b) Combination of AT 2 and AT 3 with M4 into AMT 1 and AMT 2, respectively, is designed to overcome these two faults, and, in addition, make the mine more difficult to sweep. Combination is made with the use of a ZR II motor-driven cam system to set the time interval relations between the three influence components of the unit.

### 3. Mounting

(a) The AMT 1 is mounted in LMB IV as indicated in Fig. 1. The AT 2 component is mounted normally. The M4 component is rubber-mounted with its associated batteries in fixed orientation within an aluminum tube running axially through the mine. Fixed orientation of the M4 is possible since it is capable of compensating fields from 700 mg Red to 400 mg. Blue.

(b) The AMT 2 is mounted in TMB or TMC as indicated in Fig. 2. The AT 3 component is mounted normally. The M4 component is mounted

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### Mounting (Cont'd.)

on a fixed aluminum frame on the diameter of the mine.

### 4. ZR II Mechanism

The ZR II mechanism determines the time relations between the influence components of the AMT units. Due to the shorter life of the AT 2 component, additional switching is necessary to conserve the battery in AMT 1, so a different type of ZR II mechanism is used. Two such mechanisms are known (ZR IIb and ZR IIc), but it is not known which is used in each of these combinations. The basic switching is similar, however. The ZR II mechanisms are motor-driven cam systems. Typical operation is described in Technical Report No. 291-45.

### 5. Blocking

A blocking circuit, (Fig. 3) is used to block firing if the subsonic influence causes the "T" component to react prematurely. (Contact  $r_2$  closes when the "T" component fires). If the "T" component reacts prematurely, ZR II cam 6 will be on its blocking contact when  $r_2$  closes. The low-resistance coil of  $R_5$  ( $R_{5N}$ ) is energized and  $r_5$  switches over, energizing the high-resistance coil, ( $R_{5H}$ ) which acts to produce self-holding of  $R_5$  as long as  $r_2$  remains closed, and the resistance of  $R_{5H}$  prevents detonator firing.

### 6. Operational Characteristics of AMT 1

(a) The sequence of switching operations is shown in Fig. 4. The acoustic component is normally alive and, in the usual case is actuated first. If, now, the "M" component is actuated, the ZR II mechanism is energized and runs for 120 seconds. After 1.5 sec., the vacuum-tube heaters of the "T" component are switched on and are given 5 sec. to heat. After 6.5 sec., cam switch 6 of ZR II operates, switching out the blocking circuit and switching in the firing circuit of the "T" component. If "T" (subsonic) actuation occurs before 25 sec. after "M" actuation the mine fires.

(b) If the mine does not fire after 25 sec., the ZR II switches out the plate supply to the "T" amplifier. At 28 sec., the "T" ampli-

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Operational Characteristics of AMT 1 (Cont'd.)

fier heater current is turned off. This 3- sec. interval is allowed to prevent premature firing due to the cooling of the vacuum-tube heaters.

(c) At 90 sec. the plate supply is again switched on, and the "M" component is run through latitude adjustment to assure proper adjustment in case of faulty adjustment or small changes in the prevailing magnetic field. This procedure continues until complete and is switched out at 117 sec. If this 27 sec. period is insufficient (as in the case of initial latitude adjustment) the ZR II will go through successive cycles until adjustment is complete.

(d) At 100 sec., cam switch §6 goes back to its blocking contact,

(e) If the action is triggered by "M" actuation, the "T" component amplifier will not be switched on until acoustic actuation is complete. In the normal case (A-M-T sequence) the unit will be fired by a subsonic actuation between 6.5 and 25 sec. after magnetic actuation.

7. Operational Characteristics of AMT 2.

(a) The sequence of switching operations is shown in Fig. 5. The ZR II mechanism does not control the switching of plate and heater supply to the "T" component amplifier tubes, since the battery has much longer life than in the AT 2 component of AMT 1.

(b) The acoustic component is normally actuated first and switches on the "T" component when actuated. However, the "T" component is blocked by cam switch §6 until 1.5 sec. after "M" actuation. The mine is then active for "T" firing from 1.5 sec. to 25 sec. after "M" actuation. As in AMT 1, the interval from 90-117 sec. is allowed for re-setting of the-M4 unit.

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Fig. 1  
Mounting of AMT 1 in LMB

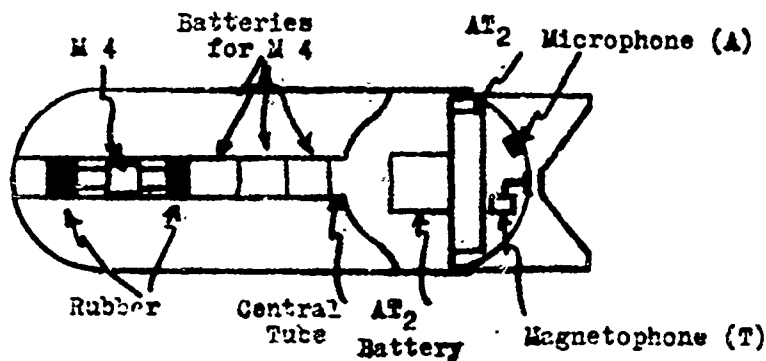


Fig. 2  
Mounting of AMT 2 in TMB/TMC

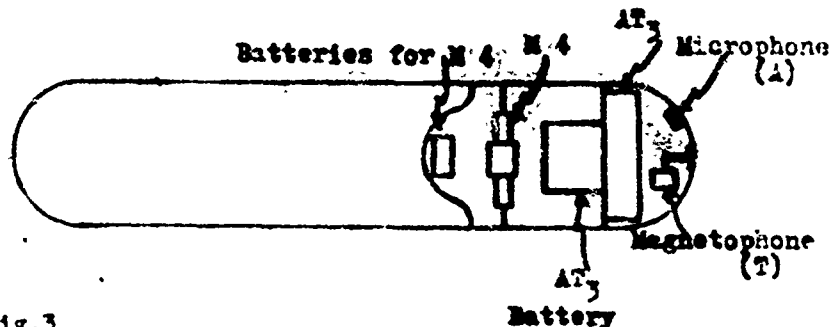
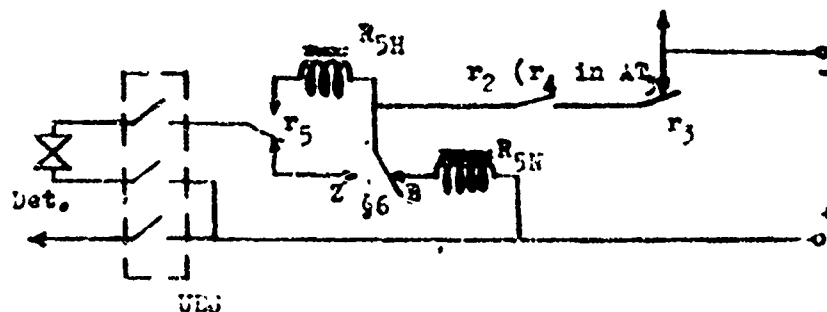


Fig. 3  
Blocking Circuit



UES - Hydrostatic Clock  
Z - Cam Switch Z6 of ZK II  
Z - Firing Contact  
B - Blocking Contact

R<sub>5H</sub> - High-resistance coil  
R<sub>5N</sub> - Low-resistance coil  
r<sub>5</sub> - Contact of R<sub>5</sub> coil  
r<sub>2</sub>, r<sub>3</sub> - Contacts of AT<sub>3</sub> relays



